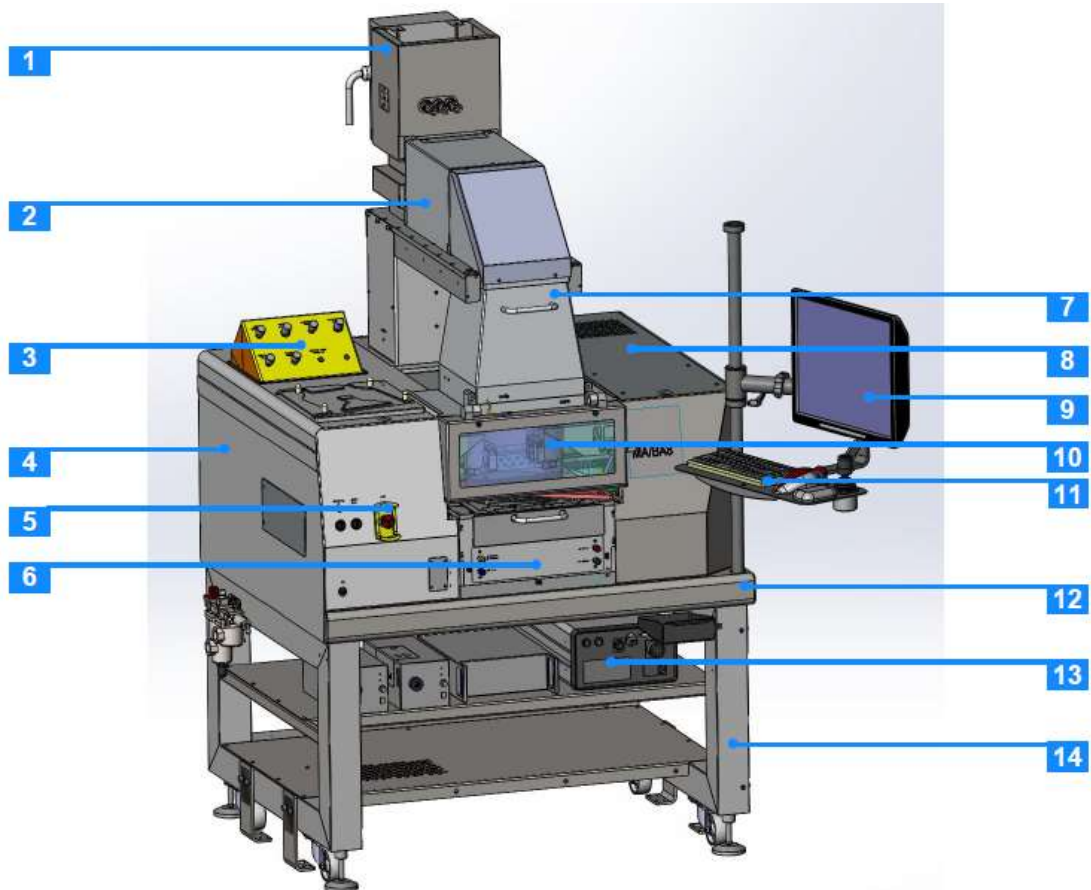


# SUSS MA6/8Gen4 光刻机

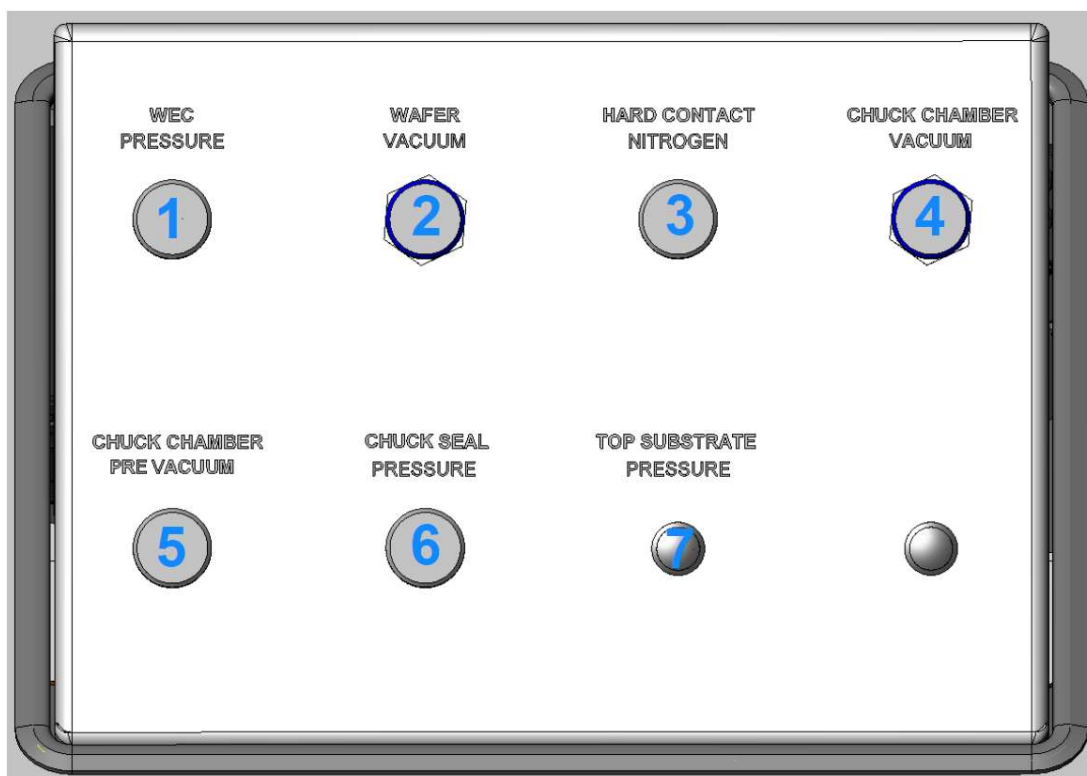
## 部件说明 & 菜单导航

正面



- |                  |                     |
|------------------|---------------------|
| 1 . 汞灯室          | 8 . 电路控制单元 (在里面)    |
| 2 . 光学光路         | 9 . 显示器             |
| 3 . 气动控制面板       | 10 . 显微镜            |
| 4 . 气动控制单元 (在里面) | 11 . 操作面板/键盘/鼠标/操纵杆 |
| 5 . 急停开关         | 12 . 设备基准           |
| 6 . 对准载片台        | 13 . 汞灯控制器          |
| 7 . 冷光镜光路        | 14 . 设备底座           |

## 气动控制面板



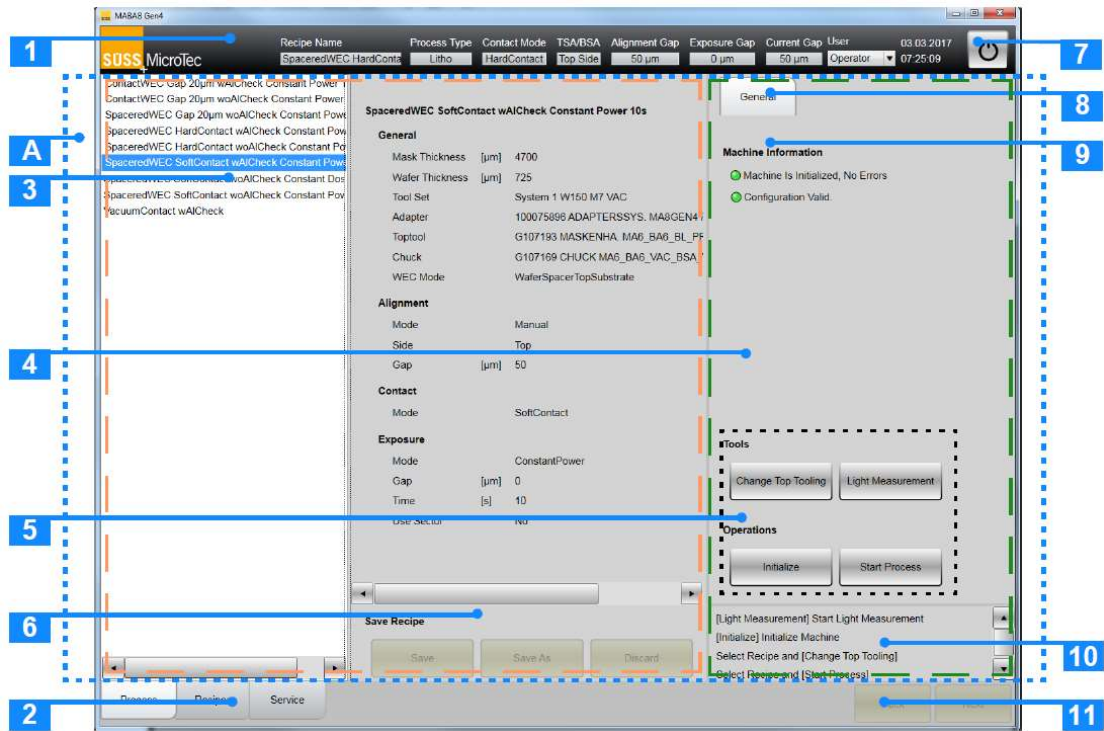
- |            |             |
|------------|-------------|
| 1. WEC 压力  | 5. 载片台腔室预真空 |
| 2. 晶圆真空    | 6. 载片台密封图压力 |
| 3. 硬接触压力   | 7. 上晶圆压力    |
| 4. 载片台腔室真空 |             |

## 操作面板



- |         |       |
|---------|-------|
| 1. 键盘   | 4. 鼠标 |
| 2. 操作面板 | 5. 手托 |
| 3. 操纵杆  |       |

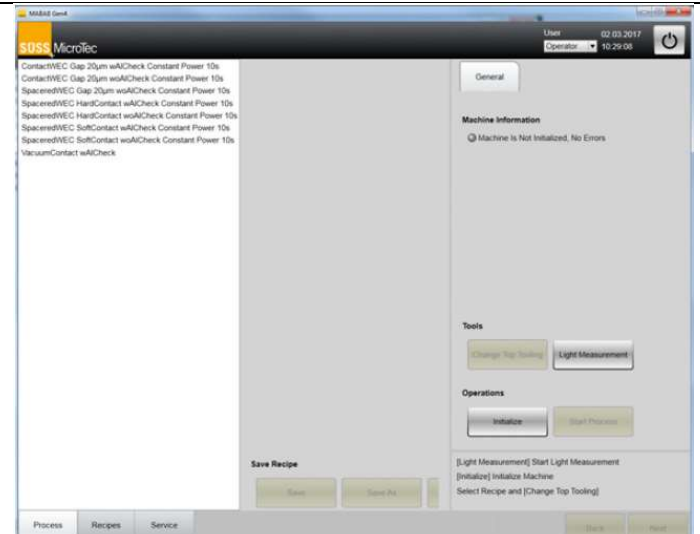
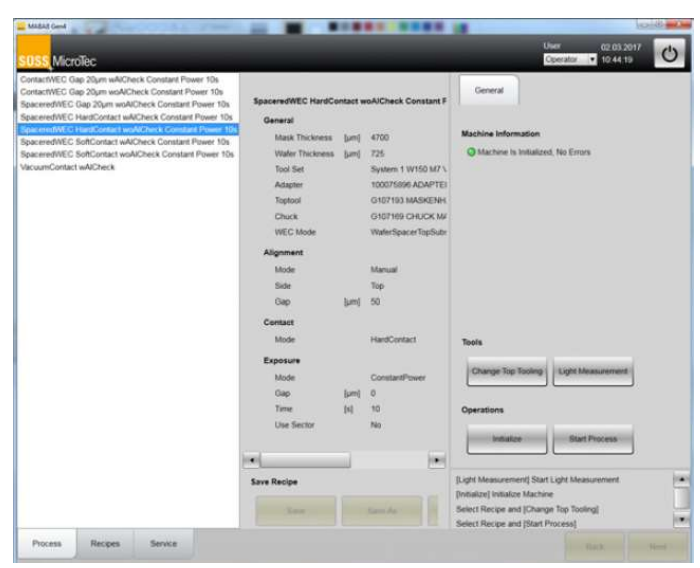
## 开始界面

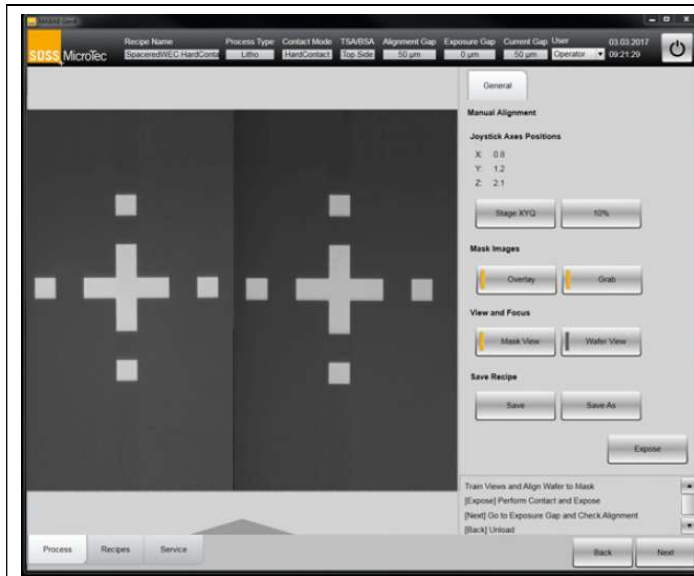


- |               |             |
|---------------|-------------|
| 1. 标题栏        | 7. 关闭软件     |
| 2. 下框架        | 8. 标签       |
| 3. 主框架 (橙色)   | 9. 设备信息     |
| 4. 制程对话框 (绿色) | 10. 操作向导    |
| 5. 功能键        | 11. 功能操作键区域 |
| 6. 菜单键区域      |             |

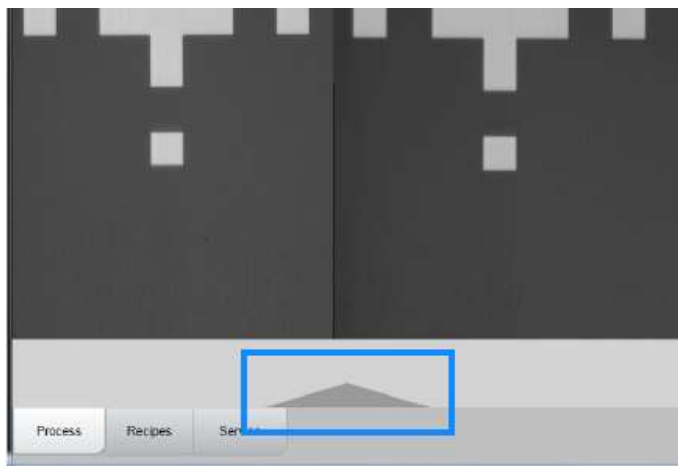
	<ul style="list-style-type: none"> <li>● 软件启动后必须先进行初始化设备</li> </ul>
	<ul style="list-style-type: none"> <li>● 制程开始按钮</li> </ul>

	<ul style="list-style-type: none"> <li>● 更换 Top tooling</li> <li>● 更换掩膜版或者掩膜版架</li> </ul>
	<ul style="list-style-type: none"> <li>● 测量光强</li> <li>● 更改光源配置</li> </ul>

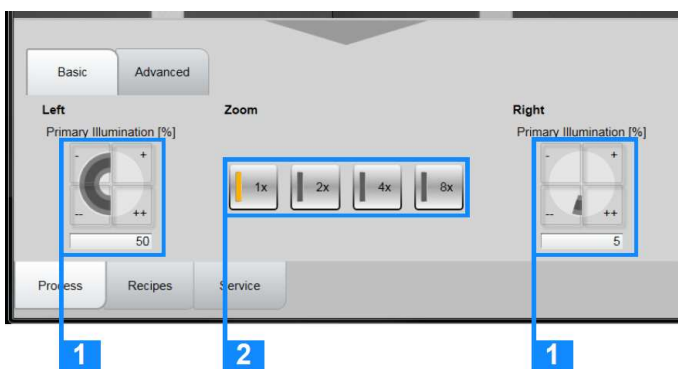
	<ul style="list-style-type: none"> <li>● 软件启动之后 <ul style="list-style-type: none"> <li>■ 显示所有菜单</li> <li>■ 初始化按钮可点击，并可进行设备初始化</li> <li>■ 测量光强可点击，并可测量光强或者更改光强配置</li> </ul> </li> </ul>
	<ul style="list-style-type: none"> <li>● 初始化之后 <ul style="list-style-type: none"> <li>■ 点击菜单列表，被选中的菜单显示蓝色</li> <li>■ 选中菜单的关键参数显示在中间窗口</li> <li>■ 制程开始按钮激活并可以开始制程</li> </ul> </li> </ul>



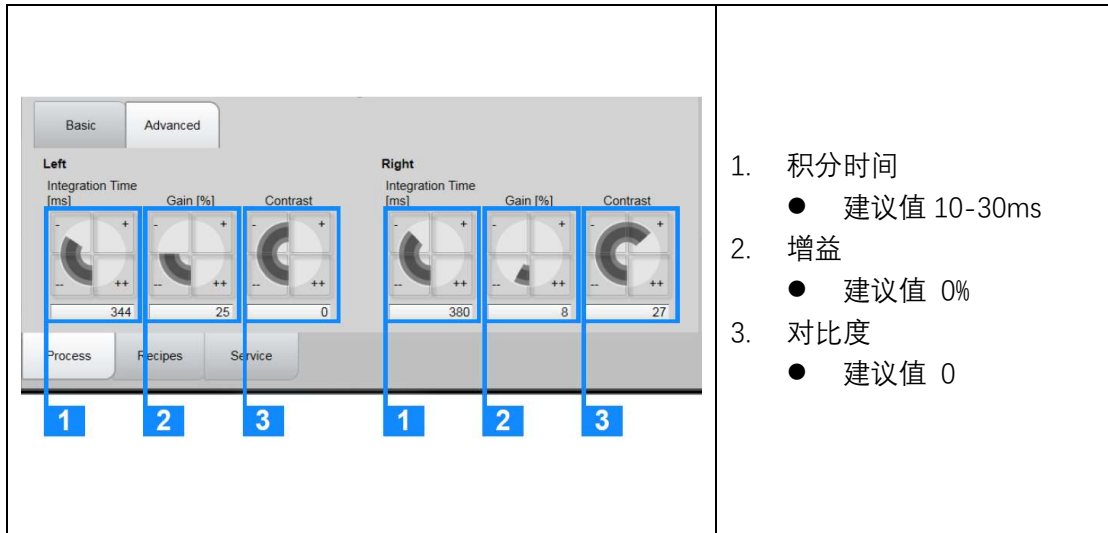
- 制程开始之后
  - 执行 WEC 并且晶圆到达对位间隙，显微镜可显示对位标记
  - 导航栏可调节操纵杆以控左显微镜/右显微镜/载物台
  - 右下角显示操作向导



- 图像调节 (蓝色框)
  - 图像质量
  - 放大倍率

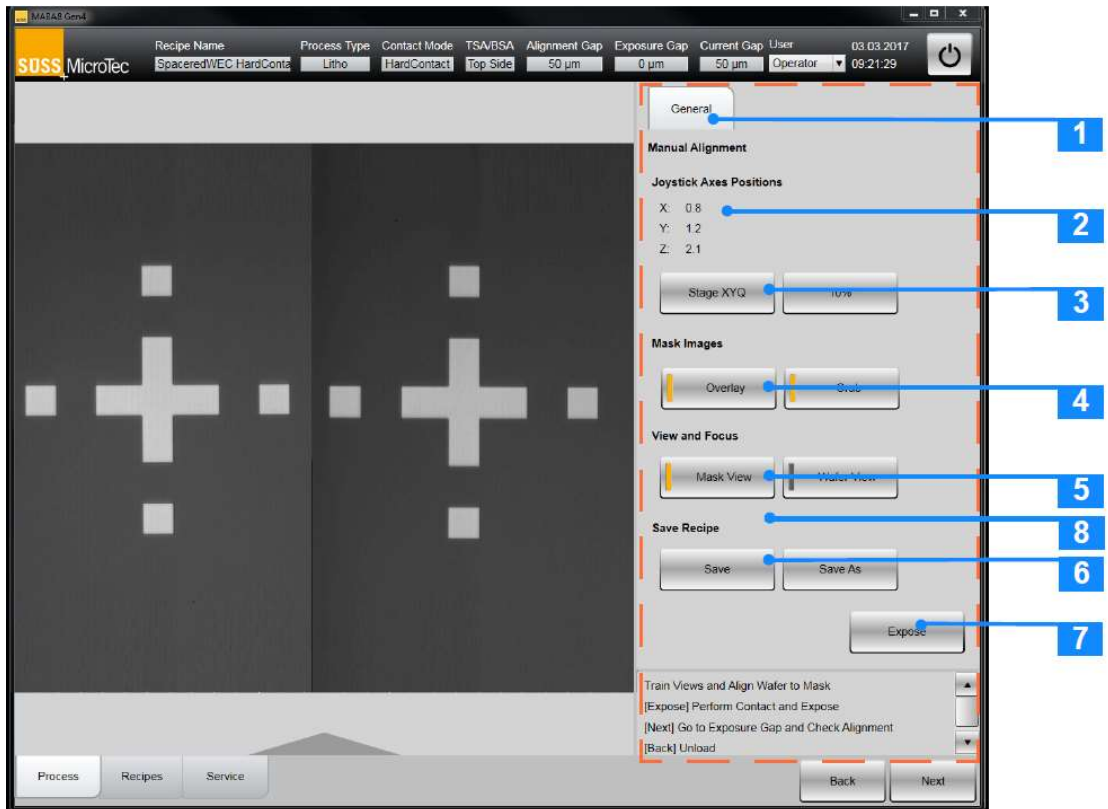


1. 亮度调节
  - +慢速加/++快速加
  - -慢速减/--快速减
2. 数字放大倍率





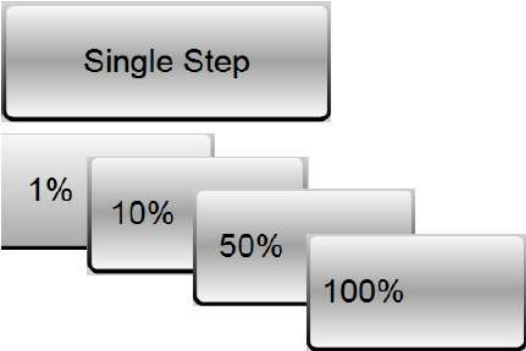

1. 积分时间
  - 建议值 10-30ms
2. 增益
  - 建议值 0%
3. 对比度
  - 建议值 0

### 操作界面



1. 操作区域
2. 坐标位置
3. 选中的坐标及速度
4. Mask 图像选项
5. 焦距
6. 菜单保存
7. 功能键
8. 单显显微镜对位（无图）

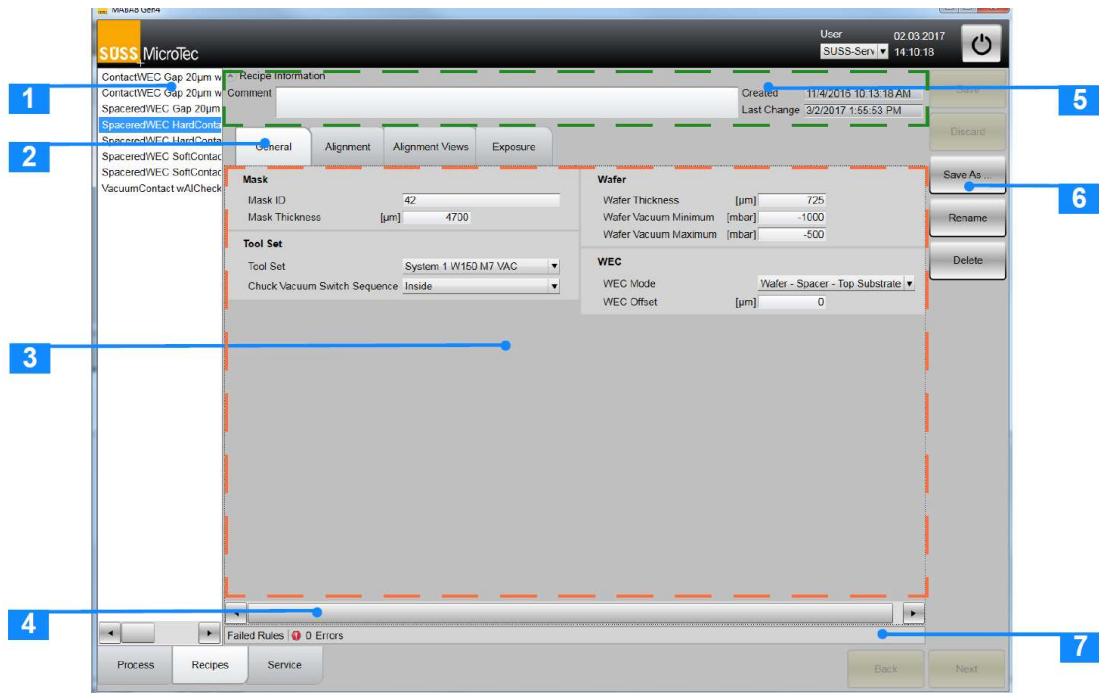
坐标系

	<ul style="list-style-type: none"><li>● 载物台 X/Y/<math>\emptyset</math> 轴</li><li>● 左显微镜 X/Y/焦距轴</li><li>● 右显微镜 X/Y/焦距轴</li></ul>
	<ul style="list-style-type: none"><li>● 左显微镜焦距</li><li>● 右显微镜焦距</li><li>● 左右显微镜焦距</li></ul>
	<ul style="list-style-type: none"><li>● 单步</li><li>● 1%速度</li><li>● 10%速度</li><li>● 50%速度</li><li>● 100%速度</li></ul>
	<ul style="list-style-type: none"><li>● 截图</li><li>● 图像重叠</li></ul>

 <p>Mask View</p>  <p>Wafer View</p>	<ul style="list-style-type: none"><li>● 掩膜版视界</li><li>● 晶圆视界</li></ul>
 <p>Save</p>  <p>Save As</p>	<ul style="list-style-type: none"><li>● 保存菜单</li><li>● 另存为菜单</li></ul>
 <p>Expose</p>	<ul style="list-style-type: none"><li>● 曝光</li></ul>

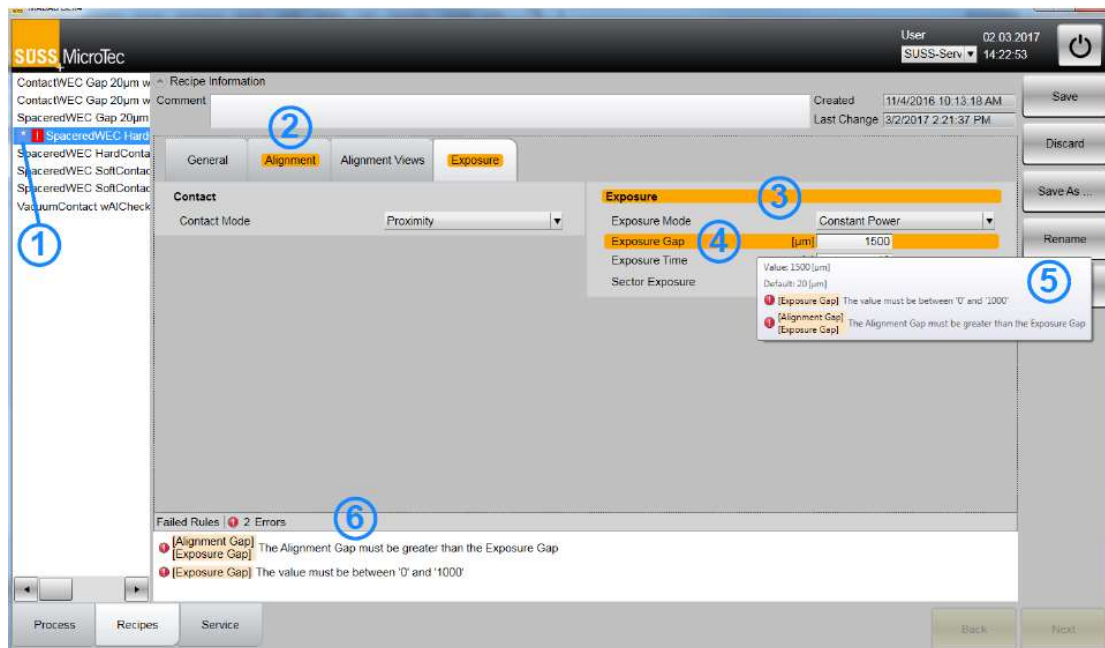


## 菜单界面一



1. 菜单列表
2. 菜单选项页面
3. 参数区域
4. 滚动条
5. 菜单信息
6. 功能键
7. 错误信息

## 菜单界面二



1. 红色标记菜单
2. 橙色标注
3. 橙色标注名称
4. 橙色标注参数行
5. 显示具体信息
6. 错误信息

## 菜单参数详解

General	Alignment	Alignment Views	Exposure
<b>Mask</b> Mask ID <input type="text" value="42"/> Mask Thickness [ $\mu\text{m}$ ] <input type="text" value="4700"/>		<b>Wafer</b> Wafer Thickness [ $\mu\text{m}$ ] <input type="text" value="725"/> Wafer Vacuum Minimum [mbar] <input type="text" value="-1000"/> Wafer Vacuum Maximum [mbar] <input type="text" value="-500"/>	
<b>Tool Set</b> Tool Set <input type="text" value="System 1 W150 M7 VAC"/> Chuck Vacuum Switch Sequence <input type="text" value="Inside"/>		<b>WEC</b> WEC Mode <input type="text" value="Wafer - Spacer - Top Substrate"/> WEC Offset [ $\mu\text{m}$ ] <input type="text" value="0"/>	

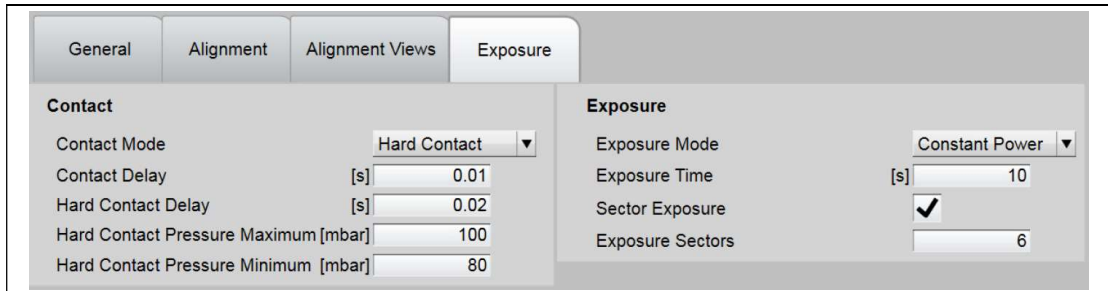
- Mask ID----Mask 名称
- Mask thickness----Mask 厚度
- Tool set----下拉选择 Tool set
- Chuck vacuum switch sequence----下拉选择 Chuck 真空方式
- Wafer thickness----Wafer 厚度
- Wafer thickness minimum----Wafer 厚度最小值
- Wafer thickness maximum----Wafer 厚度最大值
- WEC mode----下拉选择 WEC 方式
- WEC offset----WEC 补偿

General	Alignment	Alignment Views	Exposure
<b>Alignment Setup</b> Alignment Mode <input type="text" value="Manual"/> Do Alignment Check <input type="checkbox"/> Alignment Gap [ $\mu\text{m}$ ] <input type="text" value="50"/> Alignment Side <input type="text" value="Top Side"/> Single Alignment Microscope <input type="checkbox"/> Primary Illumination <input type="text" value="Top Coaxial"/> Secondary Illumination <input type="text" value="None"/> Top Lens <input type="text" value="10x"/>		<b>Align Positions</b> Left Mic Align Position X [ $\mu\text{m}$ ] <input type="text" value="-49933.125"/> Left Mic Align Position Y [ $\mu\text{m}$ ] <input type="text" value="52.5"/> Right Mic Align Position X [ $\mu\text{m}$ ] <input type="text" value="32000"/> Right Mic Align Position Y [ $\mu\text{m}$ ] <input type="text" value="0"/> Stage Align Position X [ $\mu\text{m}$ ] <input type="text" value="0"/> Stage Align Position Y [ $\mu\text{m}$ ] <input type="text" value="0"/> Stage Align Position $\Theta$ [ $^{\circ}$ ] <input type="text" value="0"/>	

- Alignment mode----对位方式
- Do alignment check----对位后检查
- Alignment gap----对位间隙
- Alignment side----对位方向
- Single alignment microscope----单显微镜对位
- Primary illumination----主照明
- Secondary illumination----次级照明
- Top lens----物镜类型
- Left mic align position X/Y----左显微镜位置 X/Y 轴
- Right mic align position X/Y----右显微镜位置 X/Y 轴
- Stage align position X/Y/ $\Theta$ ----载物台位置 X/Y/ $\Theta$  轴

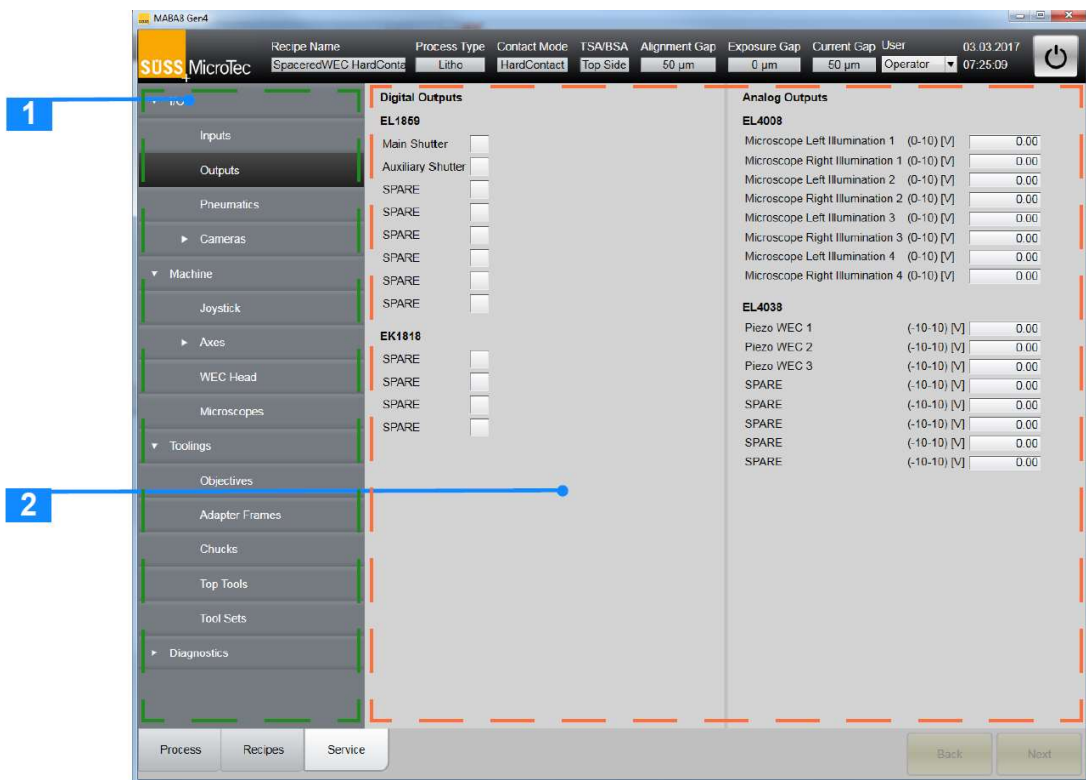
General	Alignment	Alignment Views	Exposure
<b>Left Microscope</b>		<b>Right Microscope</b>	
<b>Mask</b>		<b>Mask</b>	
Primary Illu [%]	<input type="text" value="5"/>	Primary Illu [%]	<input type="text" value="5"/>
Secondary Illu [%]	<input type="text" value="0"/>	Secondary Illu [%]	<input type="text" value="0"/>
Top Focus [ $\mu\text{m}$ ]	<input type="text" value="25502.1875"/>	Top Focus [ $\mu\text{m}$ ]	<input type="text" value="25401.640625"/>
Bottom Focus [ $\mu\text{m}$ ]	<input type="text" value="0"/>	Bottom Focus [ $\mu\text{m}$ ]	<input type="text" value="0"/>
Gain [%]	<input type="text" value="0"/>	Gain [%]	<input type="text" value="0"/>
Contrast	<input type="text" value="0"/>	Contrast	<input type="text" value="0"/>
Integration Time [s]	<input type="text" value="0.035"/>	Integration Time [s]	<input type="text" value="0.035"/>
<b>Wafer in Alignment Gap</b>		<b>Wafer in Alignment Gap</b>	
Primary Illu [%]	<input type="text" value="5"/>	Primary Illu [%]	<input type="text" value="5"/>
Secondary Illu [%]	<input type="text" value="0"/>	Secondary Illu [%]	<input type="text" value="0"/>
Top Focus [ $\mu\text{m}$ ]	<input type="text" value="22944.140625"/>	Top Focus [ $\mu\text{m}$ ]	<input type="text" value="22676.210937"/>
Bottom Focus [ $\mu\text{m}$ ]	<input type="text" value="0"/>	Bottom Focus [ $\mu\text{m}$ ]	<input type="text" value="0"/>
Gain [%]	<input type="text" value="0"/>	Gain [%]	<input type="text" value="0"/>
Contrast	<input type="text" value="0"/>	Contrast	<input type="text" value="0"/>
Integration Time [s]	<input type="text" value="0.035"/>	Integration Time [s]	<input type="text" value="0.035"/>
<b>Wafer in Exposure Gap</b>		<b>Wafer in Exposure Gap</b>	
Primary Illu [%]	<input type="text" value="50"/>	Primary Illu [%]	<input type="text" value="50"/>
Secondary Illu [%]	<input type="text" value="0"/>	Secondary Illu [%]	<input type="text" value="0"/>
Top Focus [ $\mu\text{m}$ ]	<input type="text" value="20000"/>	Top Focus [ $\mu\text{m}$ ]	<input type="text" value="20000"/>
Bottom Focus [ $\mu\text{m}$ ]	<input type="text" value="0"/>	Bottom Focus [ $\mu\text{m}$ ]	<input type="text" value="0"/>
Gain [%]	<input type="text" value="50"/>	Gain [%]	<input type="text" value="50"/>
Contrast	<input type="text" value="50"/>	Contrast	<input type="text" value="50"/>
Integration Time [ms]	<input type="text" value="16"/>	Integration Time [ms]	<input type="text" value="16"/>

- Left Microscope----左显微镜
- Mask----掩膜版
- Wafer in alignment gap----晶圆在对位间隙
- Wafer in exposure gap----晶圆在曝光间隙
- Right Microscope----右显微镜
  - ◆ Primary illu----主照明
  - ◆ Secondary illu----次级照明
  - ◆ Top focus----上方焦距
  - ◆ Bottom focus----下方焦距
  - ◆ Gain----增益值
  - ◆ Contrast----对比度
  - ◆ Integration time----积分时间



- Contact mode----- 下拉选择接触方式
- Contact delay----- 接触延时
- Hard contact delay----- 硬接触延时
- Hard contact pressure maximum----- 硬接触压力最小值
- Hard contact pressure minimum----- 硬接触压力最大值
- Exposure mode----- 下拉选择曝光方式
- Exposure time----- 曝光时间
- Sector exposure----- 分步曝光
- Exposure sectors----- 分步曝光步数

### Service 界面简介



1. 选择 Service 选项

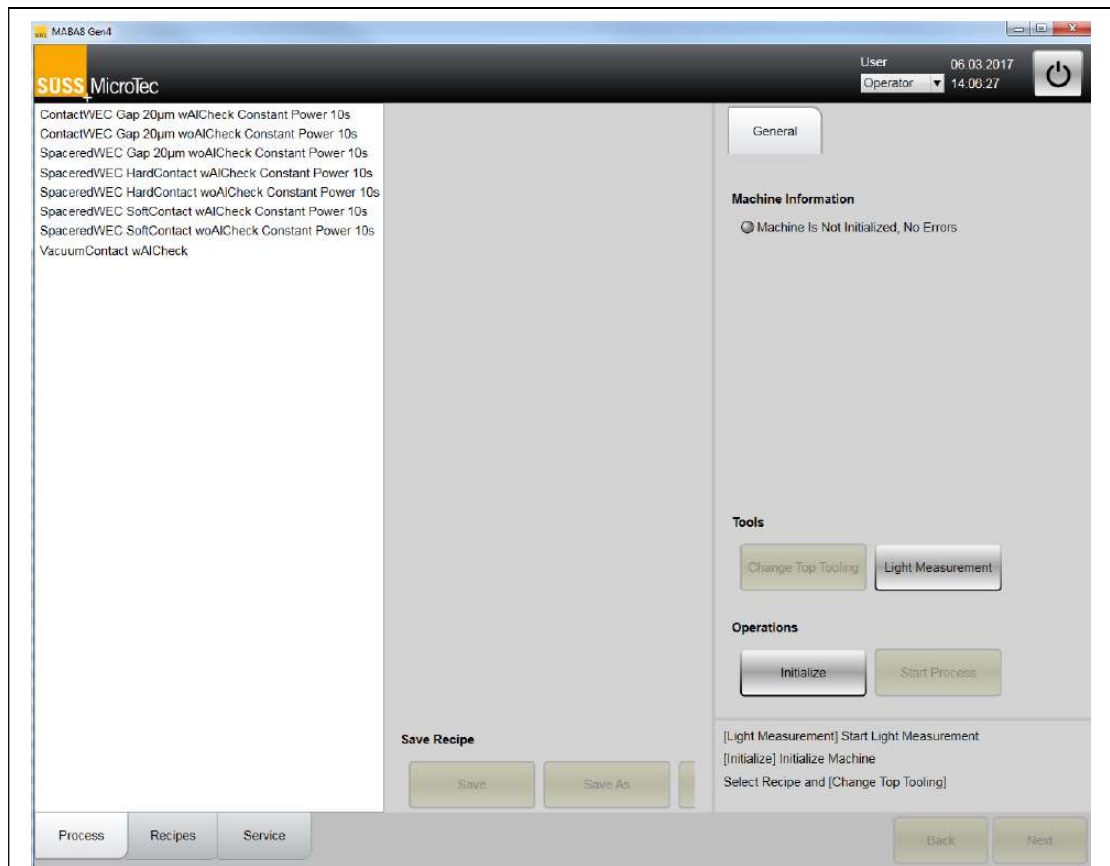
2. 参数区域

## 权限管理

	<ul style="list-style-type: none"><li>● 选择操作权限<ul style="list-style-type: none"><li>■ Operator 操作员</li><li>■ Application 工艺员</li><li>■ Service 工程人员</li><li>■ SUSS-Service 仅限 SUSS</li></ul></li></ul>
	<ul style="list-style-type: none"><li>● 选择权限</li><li>● 输入正确密码</li><li>● 点 OK 进入对应界面</li></ul>
	<ul style="list-style-type: none"><li>● 点 Change Password 修改密码</li><li>● 输入原密码</li><li>● 输入新密码</li><li>● 重复输入新密码</li><li>● 点 OK 则新密码生效</li></ul>

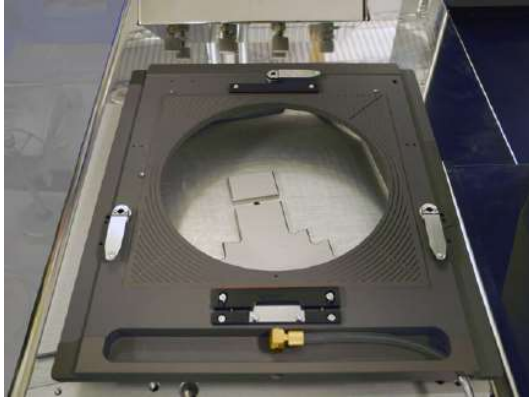
设备开机-制程-关机流程

	<ul style="list-style-type: none"> <li>● 顺时针旋转 90°打开设备主电源</li> </ul>
	<ul style="list-style-type: none"> <li>● 顺时针旋转打开设备电源</li> </ul>
	<ul style="list-style-type: none"> <li>● 顺时针旋转打开 UV 灯电源</li> </ul>
	<ul style="list-style-type: none"> <li>● 点 POWER ON 打开 UV 灯电源</li> <li>● 选择 CP/CH1/CH2</li> <li>● 点 START 点亮 UV 灯</li> </ul>

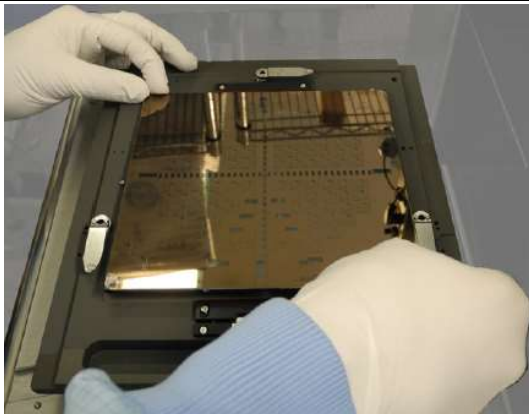


- 开机之后，软件自启动，界面如上

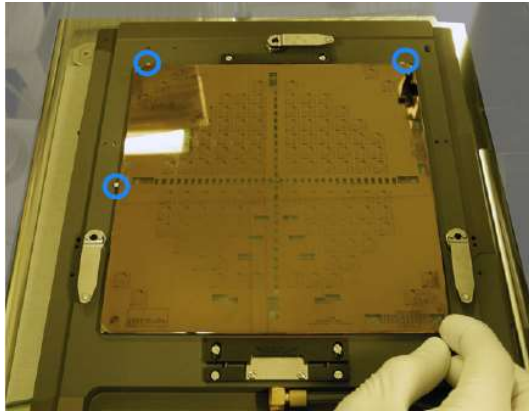
	<ul style="list-style-type: none"> <li>● 点此键设备初始化</li> </ul>
	<ul style="list-style-type: none"> <li>● 当初始化进行时点此键取消</li> <li>● 初始化完成之后，在左侧选择正确菜单</li> </ul>
	<ul style="list-style-type: none"> <li>● 点此键进入 Mask 更换界面</li> </ul>



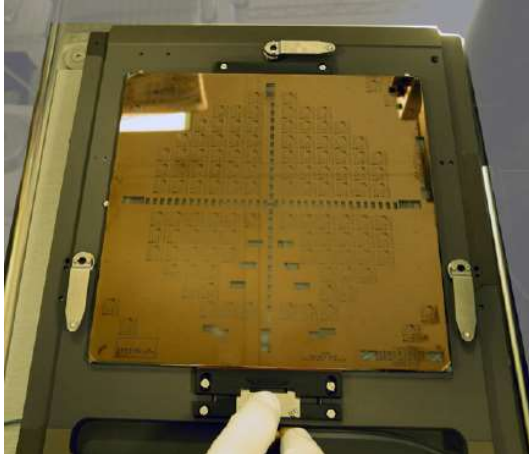
- 取出掩膜版架背面向上放置



- 放置掩膜版



- 向左上角推动掩膜版紧靠在定位杆上（蓝色位置三个定位杆）



- 按下银色弹簧片卡住掩膜版

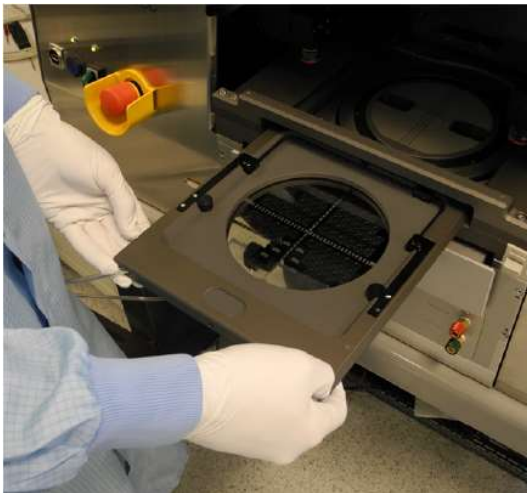




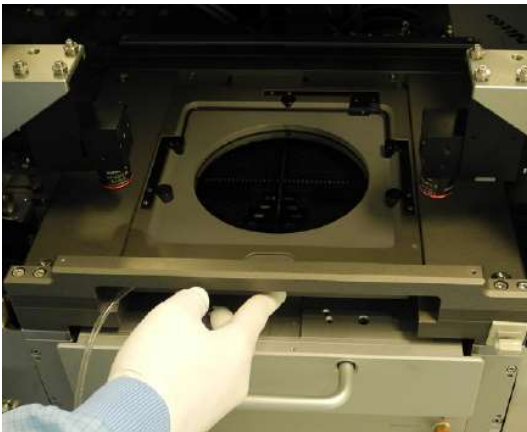
- 将掩膜版架的真控管插入 Top substrate outer vacuum



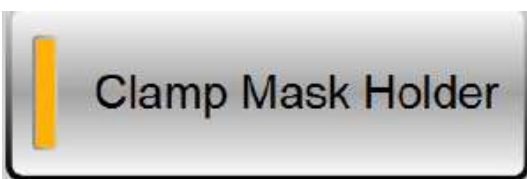
- 点此键打开掩膜版真空




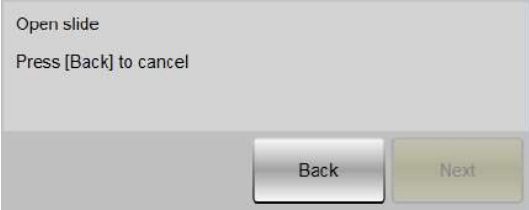
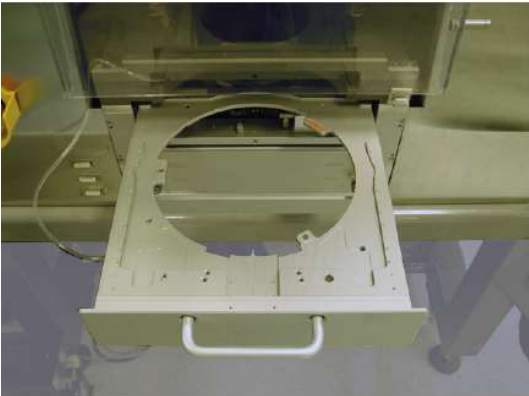
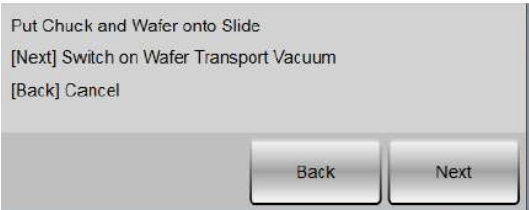
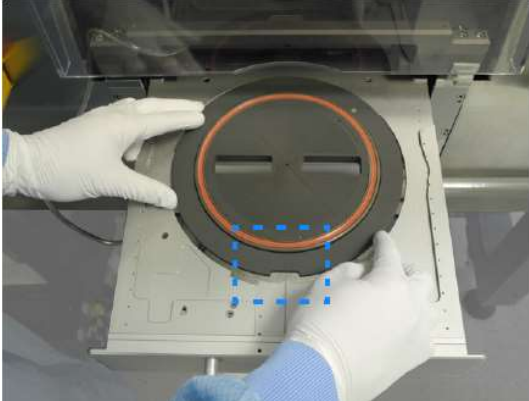

- 将掩膜版架正面向上插入设备

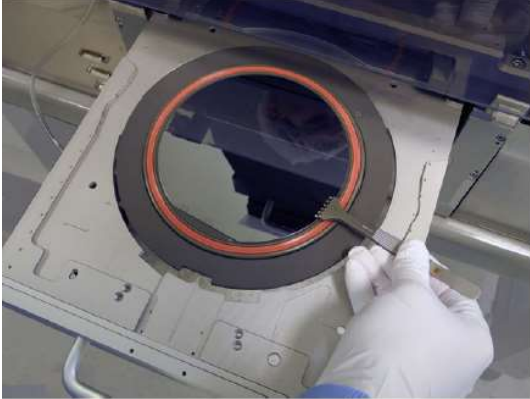
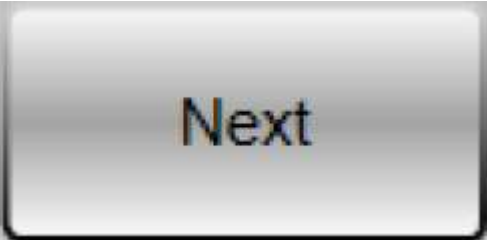
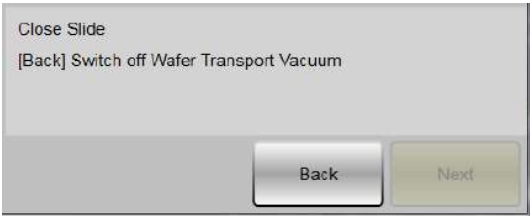
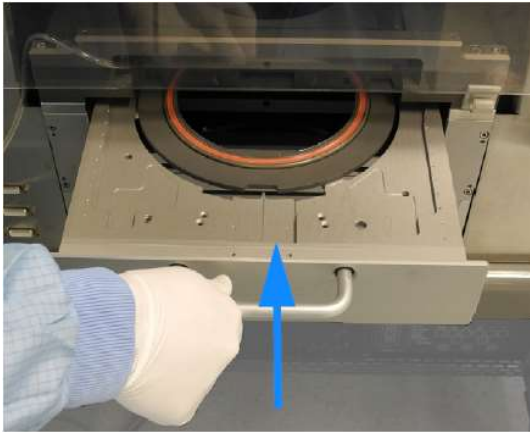
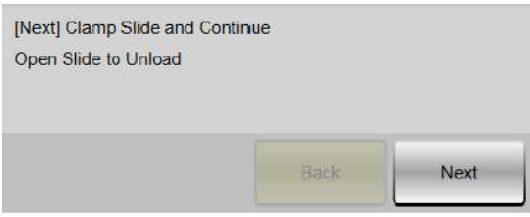



- 确保掩膜版架推到位置

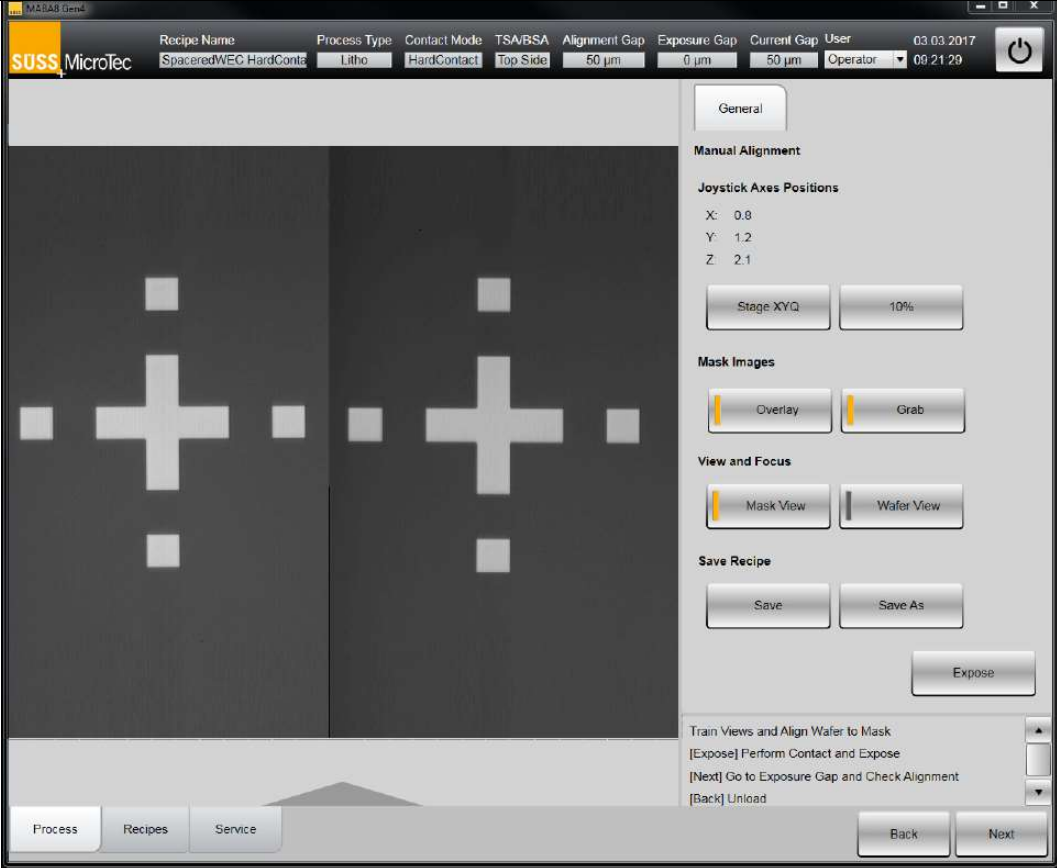


- 点此键锁住掩膜版架

	<ul style="list-style-type: none"> <li>● 点此键退出更换掩膜版架界面</li> </ul>
	<ul style="list-style-type: none"> <li>● Open slide----打开抽屉</li> <li>● Press[Back] to cancel----点 Back 则取消</li> </ul>
	<ul style="list-style-type: none"> <li>● 拉出打开抽屉</li> </ul>
	<ul style="list-style-type: none"> <li>● Put chuck and wafer onto slide--- -放置 Chuck 及晶圆于抽屉上</li> <li>● [Next]Switch on wafer transport vacuum----点 Next 打开晶圆传送真空</li> <li>● [Back]Cancel----点 Back 取消</li> </ul>
	<ul style="list-style-type: none"> <li>● 放置 Chuck 于抽屉上</li> </ul>
	<ul style="list-style-type: none"> <li>● 确保对正对位标记</li> </ul>


	<ul style="list-style-type: none"> <li>● 放置晶圆于 Chuck 上</li> </ul>
	<ul style="list-style-type: none"> <li>● 点 Next 打开晶圆传送真空</li> </ul>
	<ul style="list-style-type: none"> <li>● Close slide-----关闭抽屉</li> <li>● [Back]Switch off wafer transports vacuum-----点[Back]关闭晶圆传送真空</li> </ul>
	<ul style="list-style-type: none"> <li>● 推入抽屉</li> </ul>
	<ul style="list-style-type: none"> <li>● [Next]Clamp sile and continue-----点 Next 锁住抽屉并继续</li> <li>● Open slide to Unload-----打开抽屉取下晶圆</li> </ul>



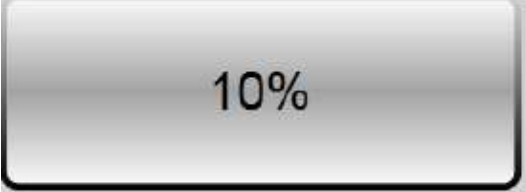
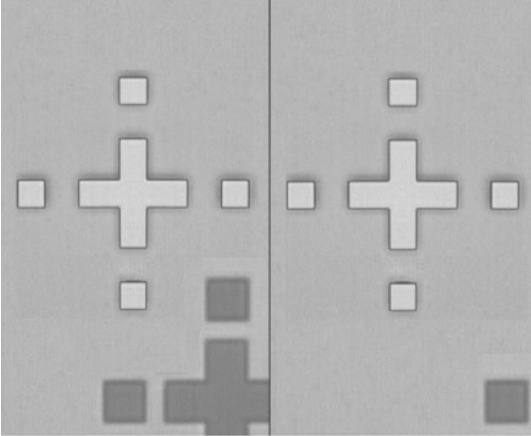


	<ul style="list-style-type: none"> <li>● 点 Next 执行 WEC</li> </ul>
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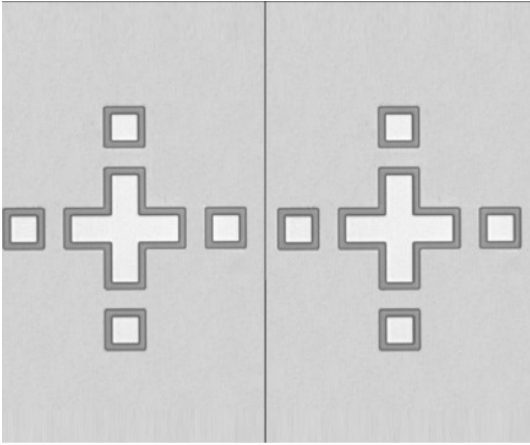

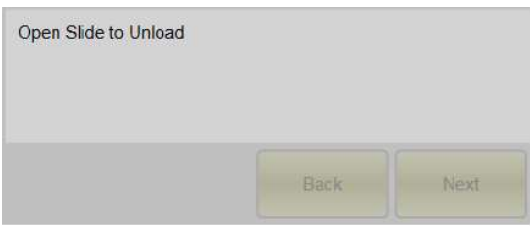
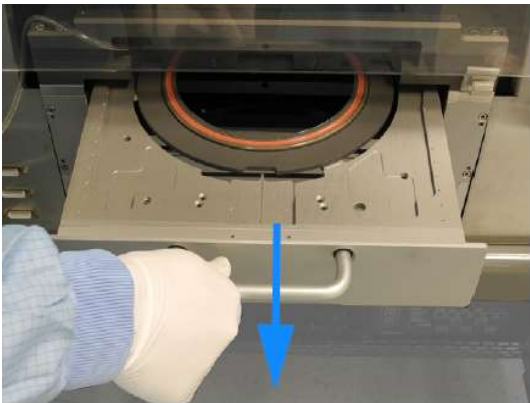


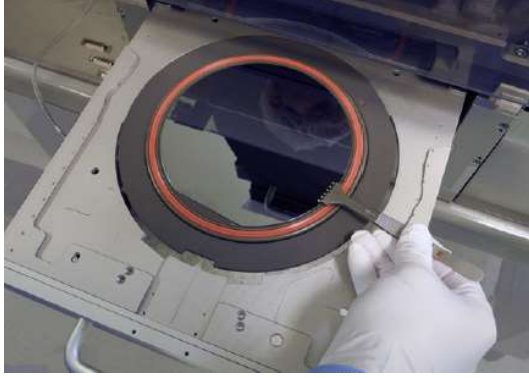
The screenshot shows the SUSS Microtec M281AB Gen4 software interface. The top status bar includes fields for Recipe Name (SpaceredWEC HardConta), Process Type (Litho), Contact Mode (HardContact), TSA/BSA (Top Side), Alignment Gap (50 μm), Exposure Gap (0 μm), Current Gap (50 μm), User (Operator), and date/time (03.03.2017 09:21:29). The main window is divided into a central view area and a right-hand control panel. The central view shows a wafer with two crosshair alignment marks. The right panel has sections for General, Manual Alignment (Joystick Axes Positions: X: 0.8, Y: 1.2, Z: 2.1), Mask Images (Overlay, Grab), View and Focus (Mask View, Wafer View), and Save Recipe (Save, Save As). An Expose button is also present. At the bottom, there are tabs for Process, Recipes, and Service, and Back/Next navigation buttons.

- WEC 执行结束后界面如上
- 此时 Chuck 停在对位间隙
- 执行对位/对位检查及曝光

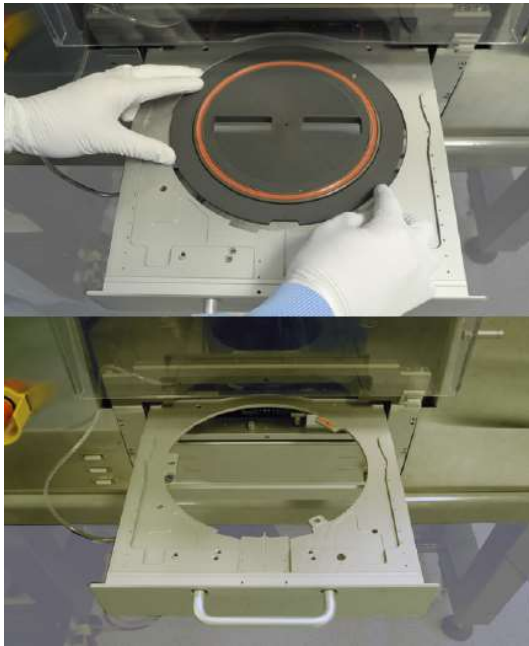
	<ul style="list-style-type: none"> <li>● 点此键将左右显微镜的焦距调节到掩膜版</li> </ul>
---	--

 <p>Left TSA XY Focus</p>  <p>Right TSA XY Focus</p>	<ul style="list-style-type: none"> <li>● 点 Left TSA XY Focus 则操纵杆控制左显微镜</li> <li>● 点 Right TSA XY Focus 则操纵杆控制右显微镜</li> </ul>
 <p>10%</p>	<ul style="list-style-type: none"> <li>● 点此键切换显微镜移动速度</li> </ul>
	<ul style="list-style-type: none"> <li>● 分别调节左右显微镜的 X 坐标轴/Y 坐标轴，使掩膜版的对位标记位于左右视场的中间位置</li> <li>● 分别调节左右显微镜焦距，使图像最清晰</li> </ul>
 <p>Stage XYQ</p>	<ul style="list-style-type: none"> <li>● 点此键将操纵杆切换至控制载物台</li> </ul>
 <p>Single Step</p>	<ul style="list-style-type: none"> <li>● 点此键切换载物台移动速度</li> </ul>

	<ul style="list-style-type: none"> <li>● 移动载物台完成晶圆标记与掩模版标记的对位</li> </ul>
<p>Train Views and Align Wafer to Mask  [Expose] Perform Contact and Expose  [Back] Unload</p>	<ul style="list-style-type: none"> <li>● [Expose]Perform contact and expose----点 Expose 到接触位置并执行曝光</li> <li>● [Back]Unload----点 Back 退回</li> </ul>
	<ul style="list-style-type: none"> <li>● 点此键执行曝光</li> <li>● 等待曝光结束</li> </ul>
<p>Open Slide to Unload</p> 	<ul style="list-style-type: none"> <li>● Open slide to unload----打开抽屉取下晶圆</li> </ul>
	<ul style="list-style-type: none"> <li>● 拉出抽屉</li> </ul>



- 用镊子取下晶圆



- 取下 Chuck



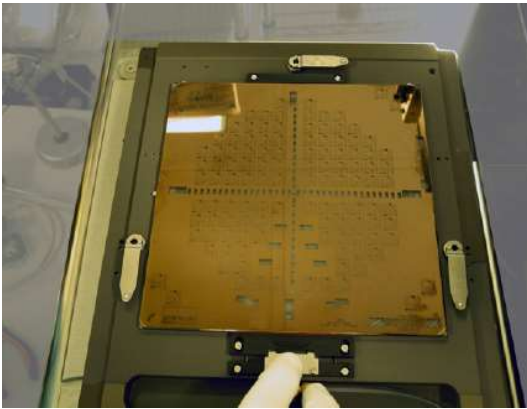
- 点此键进行掩膜版架更换界面



- 点此键解锁掩膜版架



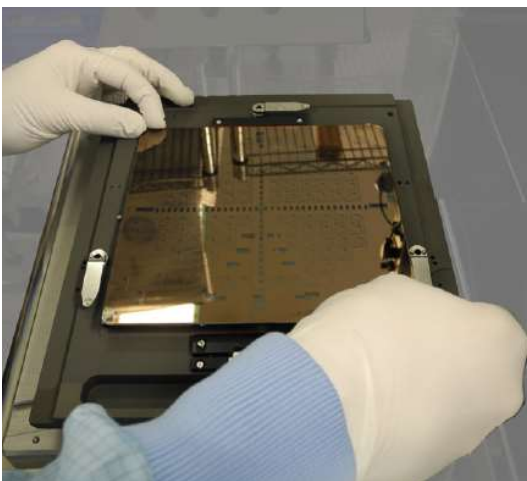
- 拉出掩膜版架



- 取下掩膜版架，翻转背面向上放置



- 点此键头释放掩膜版真空



- 取下掩膜版





- 断开真空管路



- 点 POWER OFF 关闭 UV 灯



- 点软件界面右上角此键关闭软件



- 逆时针旋转关闭设备电源



- 逆时针旋转关闭 UV 类电源



- 逆时针旋转 90°关闭设备主电源